Variables Lead to Obesity in Canada

and Their Significance Compared to Alternative Variables

By

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Abstract

To investigate the variables that relate to obesity and the relation between those variable and its alternative when it comes to obesity. By using the data from 2014 Canadian Community Health Survey (CCHS) and apply logistic regression to evaluate the difference between the variables. On top of the data calculation, review related studies and public reports from Public Health of Canada and World Health Organization to conclude this report's finding and help understanding the significance of the selected variables.

Overall, maintaining high level of physical activity level and healthy and balanced diet helps control and prevent obesity situation. There are uncontrollable variables such as age and gender, but it is still manageable with the right level of active lifestyle and balanced energy intake and calories expense level.

August 2018

Introduction

Obesity issue is a serious health concern for Canada as well as globally. Surely, overweight/obesity topics have been around for generations. This study is trying to find out the variables that causes overweight and the significance of those variables relative comparison to the alternative.

In general, Canadians measure their weight related health condition by calculating the Body Mass Index (BMI). Body Mass Index is calculated by using an individual's height in metres and weight in kilograms. The formula of BMI is the weight in kilograms over the height in metres squared (kg/m^2). An individual is considered obese if the BMI value is over 30 and overweight if the BMI value is between 25 to 29.9. Most healthy adult's aged between 18 to 65, have a BMI value range between 18.5 to 24.9.

Underweight	BMI <= 18.5 kg/m2
Normal Weight	BMI = 18.5 kg/m2 - 24.9 kg/m2
Overweight	BMI = 25 kg/m2 - 29.9 kg/m2
Overweight 1	BMI = 25 kg/m2 - 27.4 kg/m2
Overweight 2	BMI = 27.5 kg/m2 - 29.9 kg/m2
Obese	BMI >= 30 kg/m2

Table1: Internationally accepted BMI classification, source from *Obesity in Canada*, 2011

Many different variables could lead an individual to be overweight or obese. Being overweight could further lead an individual to have many health-related risks. The health problems include diabetes, high blood pressure, some heart disease, osteoarthritis and few types of cancer. The significance of overweight/obese is more than just effecting an individual's health risks, there is also economic burdens involved. The cost associated

with obesity can be categorized into direct and indirect cost. Direct cost includes medical bills, hospitalization and treatment expenses. Indirect cost that associate with obesity also includes individuals living expenses. Overall, being overweight consequences are more than just putting individuals' health at risk.

Public Health of Canada and World Health Organization

In 2009, Public Health of Canada has reported "Snapshot of Obesity in Canada", study shows that the self-reported rate of obese Canadians adults was 18 percent with the data from Canadian Community Health Survey (CCHS). However, Public Health of Canada has also estimated the actual rate of obese Canadian adults might be as high as 25 percent of population. As the figure shown below, the obese Canadian adults has an increasing rate year by year for either self-reported or measured data. According to "Obesity in Canada" by Canadian Population Health Initiative (CPHI) and the Public Health Agency of Canada (PHAC) in 2011, the obese Canadians have doubled the amount between 1981 and 2007/09 for both male and female in most age group.

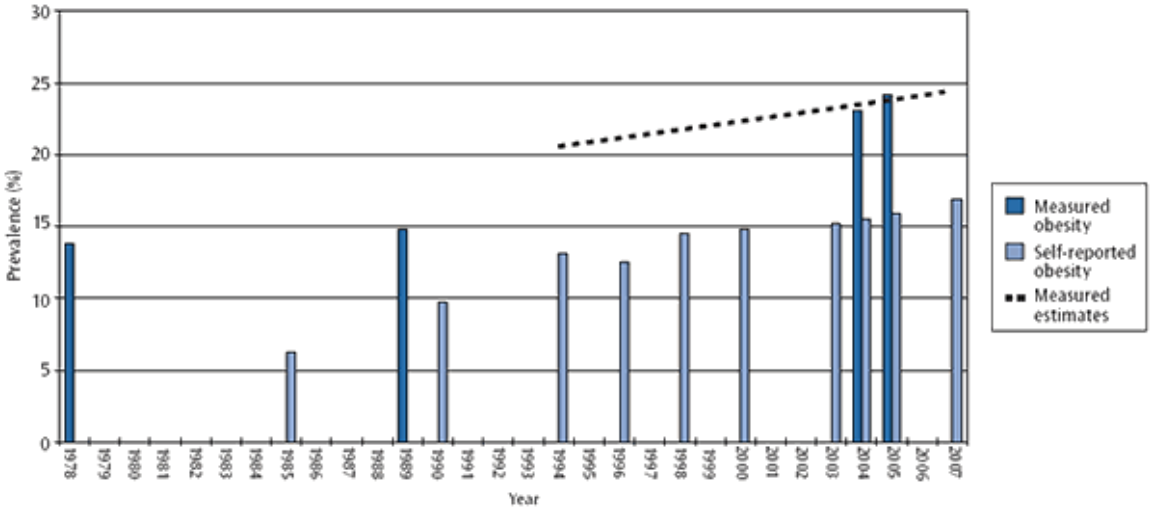

Figure 1: Percentage of the population age 18+ years who were obese (measured and self-reported), by year, *Obesity in Canada*, 1978-2007

Causes that lead to obesity is a complex and obtained varied aspects. The findings by *Obesity in Canada* concluded that most studies' results fall under individual's physical activities, diet, socioeconomic status, ethnicity, immigration, and environment factors. Although many studies obtain the suggested causes, but the complete cause affect is yet to be determined. Most relatable cause of obesity that is suggested by most researches is the physical activity level. For inactive individuals, there are more likely to be related to overweight for both male and female at any given age. On top of that, distal causes of obesity like income level and living environment are also related to overweight possibility for any individuals.

The 2011 report of *Obesity in Canada* also focus on the minority status and the relationship to obesity. The report states although there is no specific data source for the First Nation, Inuit and Metis people and their relation to overweight situation; however, by summarizing some findings and there is a pattern of being in more risk for our First Nation to be overweight for both living on the reserve aboriginals and living off the reserve aboriginals. Specifically, the 2006 Aboriginal People Survey (APS) estimated 26 percent of the aboriginal adults were obese. Similar to the overall Canadian population findings, the ratio of obese aboriginals has also been increasing throughout the years for all age groups.

One in four Canadian adults are obese. Obesity is an important concern for both health related and economic related matters. There are abundant amounts of related disease and

illness that could be prompted by being overweight and obese. On top of that, server condition of obesity could also lead to premature mortality. The exact number of premature death due to obesity is challenging to be determined as many studies have varied amount. However, the pattern of premature mortality is higher for both ends of extreme weight classes compares to normal weight class.

Addition to the health concern that associated by obesity, economic burden is also significant for obese population. The economic cost was estimated, the cost of population obesity can be categorized into direct cost such as medical associate expenditure and indirect cost such as disability expenditure. The *Obesity in Canada* report found when considering eight chronic diseases that is related to obesity, the annual economic cost ranges from $3.9 to $4.6 billion between 2000 and 2008. The cost increased to $7.1 billion when considering 18 obesity related chronic diseases in 2006. The physician cost for men and women who are obsessed also higher than those with normal weight; furthermore, the physician cost increases with age for both genders. Personal expenses such as insurance also been affected and changed with overweight population increase. Since 1930s, insurance companies have included height and weight to be part of the identification of clients risks for early death when considering life insurance. Therefore, the true economic burdens might actually be higher than expected.

Considering that the obesity and overweight situation is more than just a nation's matter, it is one of the common international health concerns. In 2018, World Health Organization (WHO) has published some new key facts about the obesity and overweight for around the globe. Since 1975, the worldwide obesity rate has tripled. More than 1.9

billion adults are overweight, that is 39 percent of adults who aged 18 and over for both genders in 2016. They summarized that the fundamental reason behind the weight gaining situation is due to the nature of energy imbalanced. The lack of physical activity such as workouts on top of more sedentary form of work environment and lifestyle. The imbalanced of energy consumed and calories expanded creates the excess energy in body which leads to the overweight/obese stage. The overweight/obese situation is a recognizable and preventable situation. The following report is going to recognize those variables and compare to the alternative outcome.

Research Question

Learning and understanding the effect with obesity condition. What are some important variables that could lead to obesity? How significant are they compares to the alternative factors?

Method

The primary research on related studies are performed with additional analysis using data from 2014 Canadian Community Health Survey (CCHS) and calculated by regression and logistic functions. The calculation was put into several logistic regressions as some of the selected variables contained limited observation. To include as many observations as possible, additional logistic regressions were required. Overall, every logistic regression contains the genders and ages as the base. The logistic regressions then further divided

into related groups of individual identity, education/occupation/income, food situation/consumption, physical health, active level and diabetes, health improvement, and mental health.

This study is using Health Statistic Canada's Canadian Community Health Survey (CCHS) for 2013/2014. The following data used for calculation is from the respondents' self opinion of their own weight. Continued by group the individuals who are overweight or not. Following by comparing the selected variables to the overweight respondents. The selected variables are conducted by the CCHS and falls under the individual's identity, physical condition or mental condition. The individual's identity includes the gender, age, located province, occupation, marital status, highest level of education, total personal income, cultural or racial region. Physical condition includes food security for adults, food situation in household, could not afford to eat balanced meal, daily consumption of total fruit and vegetables, self-perceived health, self-perceived health of teeth and mouth, physical activities, ever smoked cigarettes daily, disability or health problem, addiction to drugs or alcohol and diabetes condition. The mental condition includes distress, depression and satisfaction with life in general. All relative information was considered in the CCHS, but only the ones that has direct relationships and shows significant results are selected.

The selected data from CCHS was placed into the logistic functions to find the relation between the variables and the overweight situation for each individual respondent. For example, comparison was done to identify the status of respondents in each variable, such as the marital status of responders who are overweight and married, and the responders

who are overweight and single. Continued going in depth to discuss the ratio of the married individuals' possibility overweight situation. Followed by a short review of relative scholarly report that discussed on the similar matter. The idea of the finding is to narrow down the important variables and recognize the difference between alternative variables. If individuals cannot make certain adjustment to avoid the overweight situation, there are other variables that individuals can consider helping and improving to lower the overweight risk.

Results and Discussion

By using the CCHS information, there are 39 percent of the respondents that believe themselves are overweight. Only 56 percent of the respondents believe their weight just about right. The number above is self reported numbers and included all respondents except pregnant women and children under age 12. As previously discussed, the true measured overweight rate might be higher.

With the given information on the CCHS, the variables that lead to overweight can be narrowed down to whether the variable is a controllable or not. Such as an individual's age has direct relationship to the potential weight gain; however, age of an individual is not a controllable factor. For instance, this report found, as an individual age progress through the life time, the more likely to have weight gaining issue for both genders up to age 65. On the other hand, for variable like has an individual ever smoked cigarettes daily. An individual could have weight gaining issue before building their habit of

smoking cigarettes daily. Similarly, an individual could have been smoking cigarettes daily and consequently having weight gaining issue. Either situation, this is a controllable variable, since one can decide whether to smoke or not in life.

Individual Identity – 127,462 and 127,185 Observations

Based on the logistic function result, for all age, women are 25 percent more likely to be overweight than men. Using adult age 18 to 20 as base, as individual age progress, there are higher chances to be overweight. The peak range of the increment is between 50 to age 69. For all genders between age 55 and age 59, individual is 600 percent more likely to be overweight than an individual that just turned adulthood. The overweight rate decreases as individual turns 65 and the rate continuously to lower.

Individual's marital status also put into effect of overweighting possibility. As majority of the respondents are married, with the ratio over 42, married status is used as base. The report found, individuals whose marital status is not married are less likely to be overweight compares to the married ones. For the single and never married respondents, it has a 13 percent less likely to be overweight than ones married. Individuals that are in common-law relationship have a lower rate of overweight possibility but not significant enough compares to the married ones. The result of this finding was not unexpected. A previous study in 1995 has found that with the change of marital status especially women has tendency for weight change. The study interviewed 2,436 adults twice in one year. They conclude that weight changing for women is much more noticeable than men. Additionally, women who entered marriage has tendency to gain weight compares to the ones became unmarried or remained married (Rauschenbach, Sobal, &Frongillo, 1995).

For location variable with Nova Scotia as the home province, residents for most provinces are having the similar situation as they are less likely to be overweight except residents in Newfoundland and Labrador, Prince Edward Island and Manitoba with eight, four and one percent higher compares to Nova Scotia respectively. Although there are numbers difference, but it is not significant enough to determine that the four provinces have strong relation to individuals' overweight cause. However, among all other provinces, the residents in Quebec has the especially low rate of 45 percent less likely to be overweight compares to Nova Scotians. *Institut national de santé publique du Québec* conducted a report in 2016 about *Obesity and Overweight: What are the economic impacts in Quebec*?, the report discussed the health service used in Quebec for obese adults compares to the normal weight adults. The cost of hospitalization is a high 94 percent, compares to the national average of 44 percent. The economic cost in Quebec was almost $3 billion for obese adults. The majority of the expenditures for obese adults are going to hospitalization and medication use. Consequently, Quebec has the overweight/obesity rate significantly below the national average

Education/Occupation/Income – 53,091 Observations

Education level has put into calculation, using the highest level of education at high school graduates as the base. Majority of responders are not highly effected by the education level. Overall, mostly lower possibility on overweighting with higher level of education. Yet, for the responders who have less than high school graduation has a 15 percent of not being overweight, similar to post secondary graduates. This result may also include responders who are underage and being at a growing stage.

Work environment as the result of individuals' occupation chose also put in some major factors. Using the occupation in Trades, Transport and Equipment Operator as the base, most other occupations are more likely to be overweight except occupations relate to sales and service. Especially, individuals whose occupations are in business, finance and administration, there is 45 percent higher chance to have overweight issue. As oppose to occupations relate to sales and service, there is 3 percent chance less likely to be overweight. The rest of occupations are very similar with less than 18 percent chance of differences of overweighting.

Foreseeably, income level is a significant factor as an individual overweighting condition. There are levels of reason behind this outcome. One direct outcome is the food security situation which will be further discuss in the following. As the majority of the responders' total personal income is fall between the range of $20,001 and $39,999, therefore it is used as the base of the function. There are significant findings as the responders' income level increase, the overweight/obese condition worsen. With an individual's income level over $80,000, there are 21 percent higher risk to be overweight than an individual's income level as the base amount. Comparing to individuals who earn less than $20,000, there is 1 percent less likely to be overweight; however, the result is not significant enough to make the major judgment. The finding of individual with no income showing there is 41 percent more likely to be overweight, this could be explained as individual who are not in the labour force since this includes respondents age 15 and over.

With over 25 percent of the respondents are born outside Canada. For the different ethnicity that CCHS has capture states that more than 23 percent of respondents indicated

they are visible minority group. Based on the results, overweighting condition is actually favoring the visible minority, it shows that there is 8 percent less likely to have overweight issue.

Food Situation/Consumption – 86,551 Observations

In 2007, Effective Public Health Practice Project has done a research on determining the relationship between food insecurity and obesity. Although the findings were inconsistent for the direct relationship between food insecurity and obesity based on many of the studies reviewed. However, there is a trend towards this relationship. For the findings on this report, individual who do not have food security issue is 10 percent higher and more likely to be overweight. Similarly, for individuals who have food situation concern at home are less likely to be overweight. As mentioned above, the food condition could also be linked to the income level. For the individual who concern for the food situation and finding that often do not have enough food is 22 percent less likely be overweight compares to individual who have enough and secure food source. Continuously, for individual who could not afford to eat balanced meal taken upon 7 percent of the respondents and there is a high 78 percent to be overweight compares to individual who could afford to eat a balanced meal. The result of individuals who sometimes could eat a balanced meal is still 40 percent higher to have risk of overweight compares to individuals who could always eat a balanced meal. Continuously, the individuals who could eat fruit and vegetables more than 10 times per day is 55 percent less likely to be overweight compares to individuals who eat fruit and vegetables less than 5 times per

day. The rate of being overweight drops to 19 percent of being overweight if individuals eat fruit and vegetables between 5 to 10 times per day.

Physical Health – 12,804 Observations

A person's image of self perceived health also a sensible way to represent the overweighting situation without the measurement of BMI. Using individuals who feel their self perceived health condition was good as base, the rate of overweight possibility only drops as the self perceived health condition goes to very good at 37 percent and with excellent health condition at 66 percent less likely to be overweight. On the other hand, if individuals who self perceived health was fair, the rate is 12 percent more likely to be overweight.

Considering that possibility that individuals could suffer with oral health issue and that prevent a certain healthy diet. The finding of this variable was not expected. Using an individuals' good oral health as the base, under all oral health, there is higher or equal difference for overweight risk. Though, the difference is not significant enough.

Despite smoking does not seem to have direct relation to weight gaining issue. However, the side affects of smoking does create some body changes and mental effects. This report found that over 85 percent of the respondent have had smoked cigarettes daily, excluding the not applicable. For individuals who have ever smoked cigarettes daily is 27 percent more likely to have overweight issue compares to individuals who never smoked daily.

Active Level and Diabetes – 14,751 Observations

An individual's physical active level is also a crucial factor for overweight/obese situation. If an individual is physically very active on a weekly basis, it is 58 percent less likely to be overweight than who is moderately physically active. For individuals who are a bit active or not active at all, the ratio of being overweight increase to 105 percent and 109 percent respectively, compares to individuals who are moderately active. The numbers show a significant level on the difference between moderately active lifestyle and a bit active lifestyle. As expected physical activity level is also a very essential cause of the overweight situation. Many studies believe that an individual active level of the calories expenditure if balanced out the calorie intake, it can decrease and control the overweight situation. Nonetheless, with the balanced energy mindset, this assumption is behind the reasonable medical suggestion.

Chronical diseases also affect the overweight/obese situation. There is 6.6 percent of the respondents that have diabetes. For an individual who has any types of diabetes, it is 76 percent more likely to be overweight than an individual who does not have diabetes. The number also shows there is a strong link between the overweight and diabetes patients. Based on Public Health Agency of Canada, there are three types of diabetes, with type I, type II and gestational diabetes. Type I diabetes is an autoimmune disease which mostly develop in children and youth. Type II diabetes is a metabolic disorder which mostly develop later in life for individuals who are overweight/obese. Gestational diabetes develops by pregnant women which usually disappear after the pregnancy; however, it also increases the risk of type II diabetes development later in life. Public Health Agency of Canada states there are about 3 million which is over 8 percent of Canadians that have

diabetes in 2013-2014. Type II diabetes is preventable and manageable simply by controlling the risk factors that develops type II diabetes which also includes overweight.

Health Improvement – 9,694 Observations

Over 20 percent of the respondents have made changes to improve their health, with over 50 percent of those respondents believes the most important thing to do is to increase their physical activity level to help improve health. The numbers show that most individuals understand the importance of maintaining high physical active level. Over 70 percent of the respondents believes they should do something to improve health; however, over 50 percent of them has a barrier that prevent them from doing so. The barriers that prevent individuals from creating their healthy lifestyle is the major risk factors. By looking into their reasons such as lack of well power, stress, health issue or addiction, we can better understand the barriers and the difference that creates. With that said, consider a respondent with no barriers as the base. Lack of well power to improve their health which increases 37 percent of the risk of being overweight. For an individual whose too stress, it is 7 percent more likely of being overweight. For an individual who is unable to improve their health because their disability, it is 64 percent more likely to be overweight. For an individual whose barrier is having addiction problem, it is less likely to overweight issue as the ratio decreases by 50 percent.

Mental Health – 12,195 Observations

On top of the physical condition that effect an individuals' healthy lifestyle. Mental health should also be considered. After all, a healthy lifestyle starts from within each an every

one of us. By including mental health concerns as the part of calculation for obesity issue, there are a few indications that is considered such as distress, depression, and overall how one feels about their health compares to one year ago. For individuals who suffer with distress, it is 89 percent less likely to have overweight issue. For individuals who suffer with depression, it is 16 percent more likely to have overweight issue. With the numbers seems to be contracting the ideas. But with the basic idea that different mental illness creates different outcome which in this case, obesity.

Limitation

The Body Mass Index (BMI) calculation method is only suitable for Canadians age over 18 as recommend by the Health Canada. Additionally, the system is not suitable for pregnant or lactating women, athletes, or children age under 18. The CCHS data used in the calculation was for all responders self reporting, only excluded the pregnant women. Additionally, BMI does not measure the body fat. High level of body fat is the strong factor that causes additional health risks include premature mortality. Therefore, there are many methods to measure individuals' health status, such as waist circumference or skinfold measurement which individual could use it as an health risk identify method. Bottom line, BMI method is just the most simplified and common testing method.

The data calculation used in CCHS is based on self reported information which also includes how an individual perceived themselves and their own health status. Majority of the individual has close idea of their current health. However, it is possible that individuals who are more limited on their access to medical resource, their projection might not be as accurate as expected. Public Health Agency of Canada states that CCHS'

self reported data is easier and less expensive to collect; however, in these surveys, individuals tend to underestimate the prevalence of obesity when comparing the data to the measured ones. On top of that, there is pattern that men and women have different tendency of rating their obesity level. Women tend to over rate their overweight level and men tend to under rate their overweight level. Which could also create a difference in the final data result.

Many results of obesity or weight gaining are from their nature genetic condition or the illness later developed. However, it is challenging to identify the genetic information as part of this study. Without a full and clear time followed continuous study, it is hard to limit the variables are only the above ones. Especially when environment and economic development in area could have taken upon a major effect.

Conclusion

Overweight/obesity is a continuing global health concern. With one in four Canadians that are obese, and near 40 percent of global population that are overweight with 13 percent of those population are obese. Since obesity is a manageable and preventable health condition. Able to identify the higher potential behaviors or variables that could accelerate the weight gaining potential at the early stage is the best way to monitor or control this health condition.

Obesity and overweight situation can be measured by many methods, but the most common and simple way to identify is by using Body Mess Index (BMI). Body Mess Index is calculated with weight in kilograms over the height in metres squared (kg/m^2). An individual is considered obese if the BMI value is over 30 and overweight if the BMI value is between 25 to 29.9. This measurement method does not apply to children under age 18, pregnant women or athletes.

Being overweight not only increase the risk of numerous chronic health conditions, but also create serious economic burden either individually or nationwide. Up to 18 chronic diseases can be linked to obesity. Furthermore, sever obesity could also leads to premature mortality. Above all, the economic cost in Canada that spend on obesity related expenditure was as high as $7.1 billion in 2016.

Nonetheless, obesity is a controllable and manageable health condition. Other than the uncontrollable, there are many key variables that make the major effects for individuals' obesity condition. Maintaining a high physical active level is a key to most. Adjusting the amount of physical activities according to individuals' age and gender since they are uncontrollable factors exist. Understanding for a very active individual, the obesity rate can be affected by as low as 58 percent. Secondly, balanced and health diet by consuming recommended fruit and vegetable amount is also a crucial key. For an individual consume over 10 times per day is 55 percent less likely to have overweight or obesity issue. For individuals that healthy mindset and well power to maintain and make the needed changes in life will also help lower the risk of overweight.

In conclusion, understanding the causes that could lead to an individuals' overweight or obesity situation then manage and control those variables. Overall, a balanced energy intake and calorie expenses is the major key to manage and prevent the our health condition especially when it comes to overweight and obesity.

Logistic Regression result from Stata, 2018

Individual Identity

Number of observations = 127,462

Overweight	**Odds Ratio**	**Std. Err.**	**z**	**P>z**	**[95% Conf. Interval]**	
Age						
Between12 and 14	0.56	0.04	-8.27	0.00	0.49	0.64
Between 15 and 17	0.90	0.06	-1.65	0.10	0.79	1.02
Between 20 and 24	1.62	0.09	8.32	0.00	1.45	1.81
Between 25 and 29	2.55	0.14	16.66	0.00	2.28	2.84
Between 30 and 34	3.24	0.18	21.15	0.00	2.91	3.62
Between 35 and 39	3.81	0.21	24.30	0.00	3.42	4.25
Between 40 and 44	4.58	0.25	27.63	0.00	4.12	5.11
Between 45 and 49	5.06	0.28	29.01	0.00	4.53	5.64
Between 50 and 54	5.61	0.30	32.00	0.00	5.05	6.23
Between 55 and 59	6.09	0.32	34.01	0.00	5.49	6.76
Between 60 and 64	5.90	0.31	33.50	0.00	5.31	6.54
Between 65 and 69	5.69	0.30	32.73	0.00	5.12	6.31
Between 70 and 74	4.46	0.24	27.60	0.00	4.01	4.95
Between 75 and 79	3.24	0.18	21.13	0.00	2.90	3.61
Age 80 and older	1.71	0.09	9.70	0.00	1.53	1.91
Gender						
Female	1.25	0.02	18.39	0.00	1.22	1.28

Number of observations = 127,185

Overweight	**Odds Ratio**	**Std. Err.**	**z**	**P>z**	**[95% Conf. Interval]**	
Age						
Between12 and 14	0.56	0.04	-8.30	0.00	0.48	0.64
Between 15 and 17	0.90	0.06	-1.69	0.09	0.79	1.02
Between 20 and 24	1.60	0.09	8.04	0.00	1.42	1.79
Between 25 and 29	2.40	0.14	15.39	0.00	2.15	2.69
Between 30 and 34	3.00	0.17	19.20	0.00	2.68	3.35
Between 35 and 39	3.51	0.20	22.02	0.00	3.14	3.92
Between 40 and 44	4.19	0.24	25.14	0.00	3.75	4.68
Between 45 and 49	4.68	0.27	26.81	0.00	4.18	5.24
Between 50 and 54	5.18	0.29	29.44	0.00	4.64	5.78
Between 55 and 59	5.62	0.31	31.20	0.00	5.04	6.27
Between 60 and 64	5.42	0.30	30.50	0.00	4.86	6.04
Between 65 and 69	5.20	0.29	29.58	0.00	4.66	5.80
Between 70 and 74	4.09	0.23	24.77	0.00	3.66	4.58
Between 75 and 79	2.95	0.17	18.54	0.00	2.63	3.31
Age 80 and older	1.56	0.09	7.66	0.00	1.40	1.75

Gender						
Female	1.25	0.02	18.31	0.00	1.22	1.28
Marital Status						
Common-law	0.97	0.02	-1.25	0.21	0.93	1.02
Widowed/separated/divorced	0.91	0.02	-5.46	0.00	0.89	0.94
Single, never married	0.87	0.02	-7.57	0.00	0.84	0.90
Province						
Newfoundland and Labrador	1.08	0.05	1.70	0.09	0.99	1.18
Prince Edward Island	1.04	0.06	0.71	0.48	0.93	1.16
New Brunswick	0.83	0.03	-4.32	0.00	0.77	0.91
Quebec	0.55	0.02	-18.28	0.00	0.52	0.59
Ontario	0.87	0.03	-4.61	0.00	0.82	0.92
Manitoba	1.01	0.04	0.28	0.78	0.94	1.09
Saskatchewan	0.94	0.04	-1.53	0.13	0.88	1.02
Alberta	0.92	0.03	-2.40	0.02	0.86	0.98
British Columbia	0.80	0.03	-6.60	0.00	0.75	0.86
Yukon/Northwest/Nunavut Territories	0.78	0.04	-5.24	0.00	0.71	0.85
Education/Occupation /Income		Number of observations = 53,091				
Overweight	**Odds Ratio**	**Std. Err.**	**z**	**P>z**	**[95% Conf. Interval]**	
Age						
Between 15 and 17	1.53	0.15	4.46	0.00	1.27	1.85
Between 20 and 24	2.43	0.23	9.35	0.00	2.01	2.92
Between 25 and 29	3.13	0.30	12.05	0.00	2.60	3.76
Between 30 and 34	3.61	0.34	13.61	0.00	3.00	4.34
Between 35 and 39	4.40	0.41	15.69	0.00	3.65	5.29
Between 40 and 44	4.87	0.46	16.68	0.00	4.04	5.86
Between 45 and 49	5.36	0.50	17.97	0.00	4.46	6.43
Between 50 and 54	5.66	0.53	18.63	0.00	4.72	6.80
Between 55 and 59	5.69	0.54	18.48	0.00	4.73	6.84
Between 60 and 64	5.80	0.57	17.87	0.00	4.78	7.03
Between 65 and 69	4.77	0.53	14.07	0.00	3.83	5.92
Between 70 and 74	1.53	0.15	4.46	0.00	1.27	1.85
Gender						
Female	1.25	0.03	10.52	0.00	1.20	1.30
Highest Education						
Less than secondary school	0.85	0.03	-4.17	0.00	0.79	0.92
Some post-secondary	1.06	0.05	1.34	0.18	0.97	1.17
Post-secondary degree	0.86	0.02	-6.09	0.00	0.82	0.91
Occupations						

Business & Finance	1.18	0.03	6.45	0.00	1.13	1.25
Sales & Service	1.07	0.03	2.73	0.01	1.02	1.13
Trades &Equip. Operator	0.97	0.03	-0.98	0.33	0.91	1.03
Primary &Manufacturing.	0.93	0.03	-1.97	0.05	0.87	1.00
Income						
No income	1.41	0.30	1.62	0.11	0.93	2.12
Less than $20,000	0.99	0.03	-0.33	0.74	0.93	1.05
$40,000 to $59,999	1.06	0.03	2.15	0.03	1.00	1.11
$60,000 to $79,999	1.10	0.03	3.06	0.00	1.03	1.16
$80,000 or more	1.21	0.03	6.74	0.00	1.15	1.28
Racial Region						
Visible minority	0.92	0.02	-3.05	0.00	0.88	0.97

Food Situation/Consumption

Number of observations = 86,551

Overweight	**Odds Ratio**	**Std. Err.**	**z**	**P>z**	**[95% Conf. Interval]**	
Age						
Between12 and 14	0.60	0.05	-6.14	0.00	0.51	0.70
Between 15 and 17	0.87	0.07	-1.78	0.08	0.75	1.01
Between 20 and 24	1.52	0.10	6.06	0.00	1.33	1.74
Between 25 and 29	2.42	0.16	13.27	0.00	2.12	2.76
Between 30 and 34	3.23	0.21	17.79	0.00	2.84	3.68
Between 35 and 39	3.78	0.25	20.34	0.00	3.33	4.30
Between 40 and 44	4.47	0.29	22.85	0.00	3.93	5.08
Between 45 and 49	4.83	0.32	23.69	0.00	4.24	5.50
Between 50 and 54	5.48	0.35	26.57	0.00	4.83	6.21
Between 55 and 59	5.90	0.37	28.15	0.00	5.22	6.68
Between 60 and 64	5.85	0.37	28.04	0.00	5.17	6.62
Between 65 and 69	5.64	0.36	27.35	0.00	4.98	6.38
Between 70 and 74	4.65	0.30	23.76	0.00	4.09	5.28
Between 75 and 79	3.45	0.23	18.58	0.00	3.03	3.93
Age 80 and older	2.03	0.14	10.64	0.00	1.78	2.32
Gender						
Female	1.25	0.02	14.97	0.00	1.21	1.28
Food Security						
Yes#Food secure	1.03	0.08	0.33	0.74	0.88	1.19
Yes#Moderately food insecure	1.05	0.07	0.75	0.45	0.92	1.21
Yes#Severely food insecure	1.00	omitted				
Food Situation in Household						
Enough, but not always kinds wanted	1.05	0.03	1.45	0.15	0.98	1.11

Sometimes did not have enough	0.90	0.08	-1.20	0.23	0.76	1.07
Often did not have enough	0.74	0.11	-1.99	0.05	0.55	1.00
Could Not Afford To eat Balanced Meal						
Often true	1.56	0.12	5.61	0.00	1.33	1.82
Sometimes true	1.36	0.07	6.01	0.00	1.23	1.50
Total Fruit & Vegetables Consumption						
Eat vegetables between 5 and 10 times per day	0.81	0.01	-13.80	0.00	0.78	0.83
Eat vegetables more than 10 times per day	0.60	0.03	-12.17	0.00	0.55	0.65
Physical Health		Number of observations = 12,804				
Overweight	**Odds Ratio**	**Std. Err.**	**z**	**P>z**	**[95% Conf. Interval]**	
Age						
Between12 and 14	5.52	5.90	1.60	0.11	0.68	44.92
Between 15 and 17	1.33	0.61	0.61	0.54	0.54	3.26
Between 20 and 24	1.03	0.34	0.08	0.94	0.53	1.98
Between 25 and 29	2.48	0.80	2.84	0.01	1.32	4.65
Between 30 and 34	2.63	0.83	3.06	0.00	1.42	4.90
Between 35 and 39	3.98	1.25	4.40	0.00	2.15	7.37
Between 40 and 44	4.41	1.38	4.73	0.00	2.38	8.14
Between 45 and 49	4.04	1.27	4.44	0.00	2.18	7.49
Between 50 and 54	4.78	1.48	5.04	0.00	2.60	8.78
Between 55 and 59	5.65	1.74	5.62	0.00	3.09	10.34
Between 60 and 64	5.28	1.63	5.41	0.00	2.89	9.65
Between 65 and 69	5.42	1.67	5.49	0.00	2.96	9.90
Between 70 and 74	4.05	1.25	4.54	0.00	2.21	7.42
Between 75 and 79	3.03	0.94	3.58	0.00	1.65	5.57
Age 80 and older	1.77	0.55	1.83	0.07	0.96	3.24
Gender						
Female	1.22	0.05	5.35	0.00	1.13	1.31
Self-Perceived Health						
Excellent	0.34	0.02	-17.97	0.00	0.31	0.39
Very good	0.63	0.03	-10.25	0.00	0.57	0.68
Fair	1.12	0.07	1.72	0.09	0.98	1.27
Poor	0.68	0.06	-4.05	0.00	0.57	0.82
Oral Health						
Excellent	1.01	0.06	0.14	0.89	0.90	1.12
Very good	1.03	0.05	0.65	0.51	0.94	1.13
Fair	1.05	0.07	0.79	0.43	0.93	1.20
Poor	1.00	0.09	0.02	0.99	0.84	1.20

Ever Smoked Daily						
No	0.73	0.04	-5.39	0.00	0.65	0.82
Active Level and Diabetes		Number of observations	=	14,751		
Overweight	**Odds Ratio**	**Std. Err.**	**z**	**P>z**	**[95% Conf. Interval]**	
Age						
Between12 and 14	0.56	0.13	-2.53	0.01	0.36	0.88
Between 15 and 17	0.97	0.20	-0.16	0.87	0.65	1.44
Between 20 and 24	1.55	0.29	2.39	0.02	1.08	2.23
Between 25 and 29	2.68	0.48	5.50	0.00	1.88	3.80
Between 30 and 34	2.95	0.53	6.06	0.00	2.08	4.18
Between 35 and 39	3.11	0.54	6.47	0.00	2.20	4.38
Between 40 and 44	3.85	0.67	7.76	0.00	2.74	5.41
Between 45 and 49	4.52	0.79	8.62	0.00	3.21	6.38
Between 50 and 54	5.51	0.93	10.08	0.00	3.95	7.68
Between 55 and 59	5.58	0.94	10.24	0.00	4.02	7.75
Between 60 and 64	5.17	0.86	9.87	0.00	3.73	7.17
Between 65 and 69	5.59	0.93	10.31	0.00	4.03	7.76
Between 70 and 74	4.82	0.82	9.26	0.00	3.45	6.72
Between 75 and 79	3.16	0.55	6.61	0.00	2.25	4.44
Age 80 and older	1.64	0.28	2.86	0.00	1.17	2.30
Gender						
Female	1.12	0.04	3.18	0.00	1.05	1.21
Level of Physical Active						
Very Active	0.42	0.02	-15.16	0.00	0.37	0.47
A bit Active	2.05	0.09	16.82	0.00	1.88	2.23
Not Active	2.09	0.14	10.65	0.00	1.83	2.39
Diabetes						
Yes	1.76	0.12	8.28	0.00	1.54	2.01
Health Improvement		Number of observations	=	9,694		
Overweight	**Odds Ratio**	**Std. Err.**	**z**	**P>z**	**[95% Conf. Interval]**	
Age						
Between12 and 14	0.67	0.22	-1.24	0.22	0.36	1.26
Between 15 and 17	0.83	0.21	-0.75	0.45	0.51	1.35
Between 20 and 24	1.51	0.31	1.98	0.05	1.00	2.26
Between 25 and 29	2.76	0.55	5.08	0.00	1.87	4.09
Between 30 and 34	2.98	0.59	5.52	0.00	2.02	4.39
Between 35 and 39	3.42	0.67	6.28	0.00	2.33	5.02
Between 40 and 44	4.19	0.82	7.35	0.00	2.86	6.15
Between 45 and 49	5.27	1.05	8.31	0.00	3.56	7.80
Between 50 and 54	5.49	1.06	8.78	0.00	3.75	8.02
Between 55 and 59	6.33	1.22	9.60	0.00	4.35	9.23
Between 60 and 64	6.01	1.15	9.38	0.00	4.13	8.74

Between 65 and 69	6.72	1.31	9.79	0.00	4.59	9.84
Between 70 and 74	5.46	1.09	8.51	0.00	3.69	8.07
Between 75 and 79	4.42	0.91	7.22	0.00	2.96	6.63
Age 80 and older	2.58	0.53	4.61	0.00	1.72	3.85
Gender						
Female	1.29	0.06	5.91	0.00	1.19	1.41
Improve Health - Lack of Well Power						
Yes#Yes	1.37	0.06	6.68	0.00	1.25	1.50
Yes#No	1.00	omitted				
Improve Health - Too Stressed						
Yes#Yes	1.07	0.11	0.71	0.48	0.88	1.30
Yes#No	1.00	omitted				
Improve Health - Disability / Health Problem						
Yes#Yes	1.64	0.13	6.46	0.00	1.41	1.91
Yes#No	1.00	omitted				
Improve Health - Addiction						
Yes#Yes	0.50	0.12	-3.00	0.00	0.31	0.78
Yes#No	1.00	omitted				
Mental Health		Number of observations = 127,195				
Overweight	**Odds Ratio**	**Std. Err.**	**z**	**P>z**	**[95% Conf. Interval]**	
Age						
Between12 and 14	0.56	0.04	-8.17	0.00	0.49	0.64
Between 15 and 17	0.89	0.06	-1.73	0.08	0.79	1.01
Between 20 and 24	1.63	0.09	8.44	0.00	1.46	1.83
Between 25 and 29	2.60	0.15	16.98	0.00	2.33	2.90
Between 30 and 34	3.35	0.19	21.66	0.00	3.00	3.74
Between 35 and 39	3.95	0.22	24.82	0.00	3.54	4.40
Between 40 and 44	4.70	0.26	27.95	0.00	4.21	5.24
Between 45 and 49	5.18	0.29	29.31	0.00	4.64	5.79
Between 50 and 54	5.77	0.31	32.38	0.00	5.19	6.42
Between 55 and 59	6.30	0.34	34.49	0.00	5.67	6.99
Between 60 and 64	6.08	0.32	33.90	0.00	5.47	6.74
Between 65 and 69	5.84	0.31	33.06	0.00	5.26	6.48
Between 70 and 74	4.58	0.25	27.95	0.00	4.12	5.10
Between 75 and 79	3.24	0.18	21.01	0.00	2.90	3.61
Age 80 and older	1.67	0.09	9.19	0.00	1.50	1.86
Gender						
Female	1.24	0.02	17.82	0.00	1.21	1.27
Distress						
No	1.89	0.04	29.90	0.00	1.81	1.97
Depression						
No	0.84	0.01	-10.38	0.00	0.81	0.87
Satisfaction in Life						

Much better now than 1 year ago	1.02	0.02	0.78	0.44	0.97	1.06
Somewhat better now than 1 year ago	1.22	0.02	10.49	0.00	1.18	1.27
Somewhat worse now than 1 year ago	1.40	0.03	17.08	0.00	1.35	1.46
Much worse now than 1 year ago	1.08	0.05	1.78	0.08	0.99	1.18

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Figure Detail

Figure 1

Figure 1 shows the trend over twenty-nine years, from 1978 to 2007, in the prevalence of adult obesity in Canada, based on available years of data. Years when self-reported data are available are: 1985 (6.2%); 1990 (9.7%); 1994 (13.1%); 1996 (12.5%); 1998 (14.5%); 2000 (14.8%); 2003 (15.2%); 2004 (15.5%); 2005 (15.9%); 2007 (16.9%). Years when measured data are available are: 1978 (13.8%); 1989 (14.8%); 2004 (23.1%); 2005 (24.2%). A horizontal line depicts the estimated trend in the prevalence of adult obesity in Canada based on measured data.

Source:Public Health Agency, *Obesity in Canada*. Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using the following data sources: Measured - 1978/79 Canada Health Survey; 1989 Canadian Heart Health Surveys (ages 18-74); 2004 Canadian Community Health Survey; Nutrition; 2005 Canadian Community Health Survey. Self-reported - 1985 and 1990 Health Promotion Survey; 1994/95, 1996/97, 1998/99 National Population Health Survey; 2000/01, 2003, 2005, 2007 Canadian Community Health Survey. Note: This analysis excludes the territories. The percentages exclude non-response.